

CLAIMS

We claim:

1. A method for isolating a biological target material from other material in a
5 medium by:

- a. providing a medium including the biological target material;
- providing silica magnetic particles capable of reversibly binding the
 biological target material;
- b. forming a complex of the silica magnetic particles and the biological
10 target material by combining the silica magnetic particles and the medium;
- c. removing the complex from the medium by application of an external
 magnetic field; and
- d. separating the biological target material from the complex by eluting
 the biological target material, whereby the isolated biological target material
15 is obtained.

2. A method of isolating a biological target material according to claim 1,
wherein the biological material isolated according to the method consists of a nucleic
acid.

20 3. A method of isolating a biological target material according to claim 1,
wherein the silica magnetic particles provided in step (b) are capable of reversibly
binding at least 2 micrograms of biological target material per milligram of particle.

25 4. A method of isolating a biological target material according to claim 3,
wherein the silica magnetic particles provided in step (b) of the method are siliceous-
oxide coated magnetic particles.

30 5. A method of isolating a biological target material according to claim 1,
wherein at least 60% of the biological target material in the complex is eluted from
the particles in step (d).

6. A method of isolating a biological target material according to claim 1, wherein the biological target material eluted from the complex in step (d) contains no more than 50 parts per million of transition metal contaminants.

5 7. A method of isolating a biological target material from other materials in a medium comprising the steps of:

- a) providing a medium containing the biological target material;
- b) providing a silica magnetic particle with the capacity to reversibly bind at least 2 micrograms of biological target material per milligram of particle;
- c) forming a mixture comprising the medium and the silica magnetic particle;
- d) adhering the biological target material to the silica magnetic particle in the mixture;
- e) removing the silica magnetic particle with the biological target material adhered thereto from the mixture by application of an external magnetic field; and
- f) eluting at least 60% of the biological target material from the silica magnetic particle by exposing the particle to an elution solution.

20 8. A method of isolating a biological target material according to claim 7, wherein the biological material isolated according to the method consists of a nucleic acid material.

25 9. A method of isolating a biological target material according to claim 8, wherein the nucleic acid biological target material isolated according to the method consists of a plasmid DNA material.

30 10. A method of isolating a biological target material according to claim 8, wherein the nucleic acid biological target material isolated consists of DNA fragment material.

11. A method of isolating a biological target material according to claim 7, wherein the silica magnetic particles provided in step (b) of the method are siliceous oxide-coated magnetic particles.
- 5 12. A method of isolating a biological target material according to claim 7, wherein the mixture formed in step (c) comprises the medium, the silica magnetic particle, and a chaotropic salt, wherein the chaotropic salt concentration is sufficiently high to cause the biological target material to adhere to the silica magnetic particle in step (d).
- 10 13. A method of isolating a biological target material according to claim 12, wherein the chaotropic salt in the mixture formed in step (c) consists of a guanidinium chaotropic salt consisting of guanidine hydrochloride or guanidine thiocyanate.
- 15 14. A method of isolating a biological target material according to claim 12, wherein the concentration of chaotropic salt in the mixture formed in step (c) is at least 2 molar.
- 20 15. A method of isolating a biological target material according to claim 7, wherein the biological target material is adhered to the silica magnetic particle in step (d) by incubating the mixture.
- 25 16. A method of isolating a biological target material according to claim 15, wherein the biological target material is adhered to the silica magnetic particle in step (d) by incubating the mixture at room temperature for at least 30 seconds.
17. A method of isolating a biological target material according to claim 7, further comprising a step of washing the silica magnetic particle after removal from the medium, before eluting the biological target material from the particle.

18. A method of isolating a biological target material of claim 17, wherein the washing step is done using a wash solution comprising an alcohol and a salt.
19. A method of isolating a biological target material according to claim 18,
5 wherein the washing step is done using a wash solution comprising at least 30% alcohol by volume and a buffer.
20. A method of isolating a biological target material according to claim 7,
wherein the biological target material is eluted from the silica magnetic particle in step
10 (f) using water or an elution solution with a low ionic strength.
21. A method of isolating biological target material according to claim 7, wherein
the biological target material eluted from the silica magnetic particle in step (f) is
substantially free of macromolecular or metal contaminants.
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22. A method of isolating a plasmid DNA material from other materials in a medium comprising the steps of:
a) providing a medium containing the plasmid DNA;
b) providing a siliceous oxide-coated magnetic particle with the capacity
20 to reversibly bind at least 2 micrograms of biological target material per milligram of particle;
c) forming a mixture comprising the medium, the siliceous oxide-coated magnetic particle, and a chaotropic salt, wherein the chaotropic salt concentration in the mixture is sufficiently high to cause the plasmid DNA to adhere to the particle;
d) incubating the mixture at about room temperature until at least some
25 of the biological target material is adhered to the siliceous oxide-coated magnetic particle;
e) removing the siliceous oxide-coated magnetic particle from the mixture
30 using an external magnetic force; and

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- f) eluting at least 60% of the plasmid DNA adhered to the siliceous oxide-coated magnetic particle by exposing the particle to an elution solution.
 - 23. A method of isolating a plasmid DNA material according to claim 22, wherein the chaotropic salt in the mixture formed in step (c) is a guanidinium chaotropic salt consisting of guanidine hydrochloride or guanidine thiocyanate.
 - 24. A method of isolating a plasmid DNA material according to claim 22, wherein the concentration of chaotropic salt in the mixture formed in step (c) is between about 0.1 M and 7 M.
 - 25. A method of isolating a plasmid DNA material according to claim 22, further comprising a step of washing the siliceous oxide-coated magnetic particle after removal from the medium, before eluting the plasmid DNA material from the particle.
 - 26. A method of isolating a plasmid DNA material according to claim 25, wherein the washing step is done using a wash solution comprising an alcohol and a salt.
 - 27. A method of isolating a plasmid DNA material according to claim 25, wherein the washing step is done using a wash solution comprising at least 30% alcohol by volume and a buffer.
 - 28. A method of isolating a plasmid DNA material according to claim 22, wherein the plasmid DNA eluted from the silica magnetic particle in step (f) is substantially free of macromolecular or metal contaminants likely to interfere with further processing or analysis.
 - 29. A kit for isolating a biological target material from a medium, the kit comprising:

an aliquot of siliceous oxide-coated magnetic particles suspended in an aqueous solution in a first container, wherein the particles have the capacity to reversibly bind at least 2 micrograms of the biological target material per milligram of particle.

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30. A kit for isolating a biological target material according to claim 29, further comprising:

a chaotropic salt in a second container; and
a wash solution in a third container.

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